

Application No.: 10/676,654
Amendment Dated: November 7, 2007
Reply to Notice of: September 4, 2007

MTS-3475US

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1.-8. (Cancelled).

9. (Previously Presented) A voltage-controlled oscillator according to claim 19, further having connected in parallel thereto a frequency band setting variable capacitance circuit having a variable capacitance element, having a power supply voltage inputted to one terminal of said variable capacitance element and having a voltage according to a frequency band to be used of a plurality of voltages inputted to the other terminal of said variable capacitance element so as to change a capacitance of said variable capacitance element, wherein, when the capacitance of the variable capacitance element of said first variable capacitance circuit becomes less than a predetermined value, a variable range is reduced as to the capacitance of at least one variable capacitance circuit of said n pieces of variable capacitance circuit.

10. (Original) The voltage-controlled oscillator according to claim 9, wherein at least one variable capacitance circuit of said n pieces of variable capacitance circuit has the variable capacitance element connected in parallel to said variable capacitance element, and the voltage according to a frequency to be used of said plurality of voltages is inputted to the other terminal of one of said variable capacitance elements instead of said control voltage so that the variable range is reduced as to the capacitance of at least one variable capacitance circuit of said n pieces of variable capacitance circuit according to the reduction in the capacitance of the variable capacitance element of said frequency band setting variable capacitance circuit.

11. (Original) The voltage-controlled oscillator according to claim 9, wherein said blocking capacitor is comprised of two or more capacitors connected via a switch, and said switch is off or on according to the frequency to be used so

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that the capacitance of said blocking capacitors is reduced and a variable range of the capacitance of at least one of said n pieces of variable capacitance circuit is reduced.

12.-18. (Cancelled).

19. (Currently Amended) A voltage-controlled oscillator comprising:

an inductor circuit having an inductor;

n pieces (n is three or more) of variable capacitance circuit having a variable capacitance element and having blocking capacitors of interrupting a direct current at both ends thereof, said n pieces of variable capacitance circuit including first, second and third variable capacitance circuits,

a negative resistance circuit, and

reference voltage generation means having m pieces of resistance connected in series between a power supply voltage and a grounding potential wherein:

m is at least two;

said inductor circuit, said n pieces of variable capacitance circuit, and said negative resistance circuit are connected in parallel;

said reference voltage generation means dividing the power supply voltage by use of said m pieces of resistance to supply m pieces of reference voltage to one terminal of the variable capacitance elements of said n pieces of variable capacitance circuit from m pieces of connecting point between adjacent resistances of said m pieces of resistance;

a control voltage of feedback-controlling an oscillation frequency is inputted to the other terminals of the variable capacitance elements of said n pieces of variable capacitance circuits;

said n pieces of variable capacitance circuit are connected in parallel with each other so that each capacitance variation characteristic against said control

voltage inputted to said variable capacitance circuit has the same-directed characteristic;

said control voltage inputted to the other terminals of the variable capacitance elements of said n pieces of variable capacitance circuits is the same voltage;

in said reference voltage generation means, a first resistance (R_b) and a second resistance (R_e) connected successively are configured so that a first reference voltage is supplied from a connection point positioned between said first resistance (R_b) and said power supply voltage, a second reference voltage is supplied from the connection point between said first resistance and said second resistance, a third reference voltage is supplied from a connection point positioned between said second resistance (R_e) and said grounding potential, and the resistance values of said first resistance and said second resistance are different than each other,

of said n pieces of variable capacitance circuits, said first reference voltage is inputted to one of the terminals of said first variable capacitance circuit, said second reference voltage is inputted to one of the terminals of said second variable capacitance circuit, and said third reference voltage is inputted to one of the terminals of said second variable capacitance circuit;

said first reference voltage, said second reference voltage, and said third reference voltage are fixed respectively; and

a first difference between said first reference voltage and said second reference voltage and a second difference between said second reference voltage and said third reference voltage are each different than each other wherein the linearity of a resonant frequency characteristic of the voltage-controlled oscillator is improved.

20. (Previously Presented) The voltage-controlled oscillator according to claim 19, wherein at least one of said first variable capacitance circuit, said second

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variable capacitance circuit, and said third variable capacitance circuit is an accumulation MOS.

21. (Previously Presented) A radio communication apparatus having a PLL circuit of outputting a signal of a target frequency, said PLL circuit having the voltage-controlled oscillator according to claim 19.